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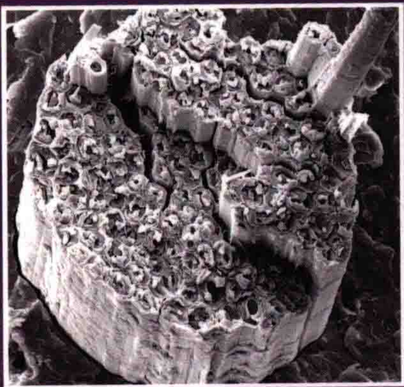

Biofiber Reinforcement in Composite Materials

Edited by Omar Faruk and Mohini Sain

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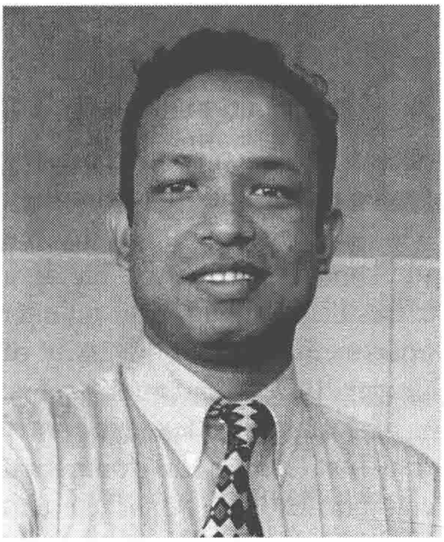

Dr Omar Faruk completed his B.S. and M.S. in Chemistry at the University of Chittagong, Bangladesh. With a DAAD (German Academic Exchange Service) scholarship, he joined at University of Kassel, Germany. He achieved his PhD in Mechanical Engineering at 2005. He worked at the Department of Forestry, Michigan State University, USA as a Visiting Research Associate from 2006 to 2009. Since 2010, he is working at the Centre for Biocomposites and Biomaterials Processing, University of Toronto, Canada. He has more than 70 publications (including a book) to his credit which have been published in different international journals and conferences. He is also an invited reviewer of 48 international reputed journals.

Professor Mohini Sain

Professor Mohini Sain is Dean and professor at Faculty of Forestry, University of Toronto. He specializes in advanced nanocellulose technology, biocomposites and bio-nanocomposites. He is cross-appointed to the Department of Chemical Engineering and Applied Chemistry. He is a fellow of Royal Society of Chemistry, UK. Besides, he is also an adjunct professor of the Chemical Engineering Departments at the University of New Brunswick, Canada; King Abdulaziz University, Jeddah Saudi Arabia; University of Guelph, Canada, University of Lulea, Sweden, Honorary Professor at Slovak Technical University and Institute of Environmental Science at the University of Toronto, and collaborates with American and European research institutes and universities. Prof. Sain holds several awards; the most recent one is the Plastic Innovation Award and KALEV PUGI Award for his innovation and contribution to Industry. Author of more than 300 papers and hi-cited researcher Professor Sain hugely contributed to society at large by translating research to commercialization which led to three new companies making products ranging from packaging to automotive to building construction.

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Preface

Recent trends such as increasing oil prices, depletion of fossil resources and increasing greenhouse gas emissions have encouraged the development of new biodegradable materials produced from renewable resources. In this respect natural fiber-reinforced polymer composites have been developed to replace synthetic composites. There are more than 1000 species of cellulose plants available in fiber form and a number of them are being investigated as composite reinforcement materials. This is part of an increasing interest in investigating new biofibers from a range of sources (such as petiole bark, rachis, rachilla, spatha, palmyrah, talipot, *Sansevieria cylindrica*, sea grass, coconut tree leaf sheath, vakka, okra, elephant grass, abaca leaf fiber, *Sansevieria rifasciata*, *Phormium tenax*, alfa, piassava, isora, *Sansevieria ehrenbergii*, sunflower stalk flour and *Opuntia ficus indica*). Composites with biofibers as reinforcements have potential applications as low-cost building materials, automobile components and other biomedical applications.

There has been research in biocomposites for well over a decade which has demonstrated such advantages of cellulosic fibers as excellent stiffness and strength. However, this has not led to the hoped-for range of applications because of their drawbacks. One problem is variability in fiber quality due to factors such as variations in plant growth, harvesting and extraction. Problems of interfacial adhesion between biofiber and polymer matrix, moisture absorption and long-term durability (affected by ultraviolet light, temperature, and humidity) are also important issues which needed to be resolved.

In recent years, there have been a number of books published on biofiber-reinforced composites covering general processing, properties, performance criteria and applications. This book focuses specifically on biofibers as reinforcements in composite materials. The main biofibers are sub-categorized based on their origin (Part I Bast fibers, Part II Leaf fibers, Part

III Seed fibers, Part IV Grass, reed and cane fibers, and Part V Wood, cellulosic and other fibers including cellulosic nanofibers). Chapters on a specific biofiber review their sources and cultivation, production, fiber properties and modification, integration into matrices, performance and current applications. The book will be helpful to researchers, engineers, chemists, technologists and professionals who would like to know more about the development and potential of natural fiber-reinforced composites.

Omar Faruk and Mohini Sain

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